REMARKS

Election Requirement

The Examiner has required an election in the present application between:

Species 1, illustrated in Fig(s). 1-3; and

Species 2, illustrated in Fig(s). 4-7.

For the purpose of examination of the present application, Applicants elect Species 1, illustrated in Fig(s). 1-3, without traverse.

Claim(s) 2, 7-10, and 13-19 are directed to the elected species. As acknowledged by the Examiner, No claims are generic.

Should there be any outstanding matters that need to be resolved in the present application, the Examiner is respectfully requested to contact **Robert Downs**, Registration No. 48,222 at the telephone number of the undersigned below, to conduct an interview in an effort to expedite prosecution in connection with the present application.

☐ Attached is a Petition for Extension of Time.

☐ Attached hereto is the fee transmittal listing the required fees.

§ 112, first paragraph

Claims 2, 4, 7-10 and 13-19 have been rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. Applicant respectfully traverses this rejection.

The present invention relates to a display apparatus having a display panel that can be viewed from both a front surface and a back surface. An embodiment of the present invention includes a display panel in which many display elements are arranged in a matrix manner (specification at page 8, top paragraph). The embodiment includes an active matrix display panel DP, a control circuit CC, pairs of liquid crystal shutters 2as/2bs, and an image signal source SG (See Fig. 2).

The active matrix display panel is one which can receive a horizontal direction scan signal and a video signal for each display element (specification at page 9, second paragraph). The display panel is such that upon receiving a low horizontal direction scan signal, the video signal will be displayed normally (left-to-right), and upon receiving a high horizontal direction scan signal will display the video signal in reverse (right-to-left).

Sharp Corporation, the assignee of the present application, produces a large number of types of display modules which have an input for a horizontal display direction signal. Applicant provides herewith an example product specification for a display module having such a horizontal display direction signal. The example product specification is for an LCD display, rather than a two-sided electroluminescent display panel of the present invention. The example is provided for purposes of showing what is meant by a display capable of receiving a horizontal display direction signal. The example display has an R/L input for receiving a horizontal display mode select signal. Associated resulting images are provided in Note 4-2.

The Office Action states that it is not possible for the row driver to perform the function of "inverting the direction of a horizontal scan along a row on said display panel in each frame or each field." The Office Action goes on to state that the function must be performed by a circuit associated with the signal driver.

Applicant submits that the assumptions made in the Office Action are incorrect. As disclosed in the present specification, the display panel of the present invention has an input port for receiving a horizontal direction scan signal. The horizontal direction scan signal is a signal input to the display panel to specify the "direction" of horizontal scan.

The Office Action alleges that the scan inverting circuit 15 of the present invention is defined as a simple inverter which inverts the horizontal direction scan signal output from the scan driving circuit.

Applicant submits that the scan inverting circuit is disclosed as inverting the horizontal direction scan signal. However, the scan inverting circuit 15 also ensures that a horizontal direction scan inverted signal is provided to the display panel each frame and provides an appropriate interface for connecting to the display panel.

The Office Action also provides a new name of "direction circuit." Applicant submits that although "direction circuit" appears to describe a function performed by the scan inverting circuit, "direction circuit" is not the term disclosed in the present specification. Applicant requests that the term "scan inverting circuit" be maintained.

For at least the above reasons, Applicant requests that the rejection under 35 U.S.C. 112, first paragraph, be reconsidered and withdrawn.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to our Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. § 1.16 or under § 1.17; particularly, extension of time fees.

Dated: February 5, 2009

Respectfully submitted,

By Robert Downm #48222

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SHARP

LQ057Q3DC02

Color TFT LCD Module

(Model Number: LQ057Q3DC02)

Specifications

Spec No.: LCY-99073B

Dated: May 31. 2002

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PREPARED BY : DATE	SHARP	SPEC No. LCY-99073B
		FILE No.
APPROVED BY : DATE		ISSUE : Apr. 18. 2001
	TFT LIQUID CRYSTAL DISPLAY GROUP SHARP CORPORATION	PAGE : 18 pages
	SPECIFICATION	DEVELOPMENT ENGINEERING DEPT. II TFT DIVISION. I

DEVICE SPECIFICATION FOR

TFT-LCD module

MODEL No. LQ057Q3DC02

☐ CUSTOMER'S APPROVAL

DATA

BY

PRESENTED

BY S. Yasuda

S. YASUDA

DIVISION DUPTY GENERAL MANAGER

DEVELOPMENT ENGINEERING DEPARTMENT II

TFT DIVISION. I

TFT LIQUID CRYSTAL DISPLAY GROUP

SHARP CORPORATION

RECORDS OF REVISION

MODEL No：LQ057Q3DC02

SPEC No ：LCY－99073

	NO.	PAGE	SUMMARY	NOTE
1999. 5.26	LCY－99073	-	-	1 st Issue
1999. 8.30	LCY－99073A	17	Outline dimensions	Changed
2000. 4.18	LCY－99073B	13	11-1 :	
			M2.6 Tapping screw	
			→ M3 Tapping screw	

The device listed in these specification sheets was designed and manufactured for use in general electronic equipment.

In case of using the device for applications such as control and safety equipment for transportation (aircraft, trains, automobiles, etc.), rescue and security equipment and various safety related equipment which require higher reliability and safety, take into consideration that appropriate measures such as fail-safe functions and redundant system design should be taken.

Do not use the device for equipment that requires an extreme level of reliability, such as aerospace applications, telecommunication equipment (trunk lines), nuclear power control equipment and medical or other equipment for life support.

SHARP assumes no responsibility for any damage resulting from the use of the device which does not comply with the instructions and the precautions specified in these specification sheets.

Contact and consult with SHARP sales representative for any questions about this device.

1. Application

This specification applies to color TFT-LCD module, LQ057Q3DC02.

2. Overview

This module is a color active matrix LCD module incorporating amorphous silicon TFT (Thin Film Transistor). It is composed of a color TFT-LCD panel, driver ICs, control circuit, power supply circuit and a backlight unit. Graphics and texts can be displayed on a 320×3×240 dots panel with 262,144 colors by supplying 18 bit data signal (6bit/color), four timing signals.

The TFT-LCD panel used for this module is a low-reflection and higher-color-saturation type. Therefore, this module is also suitable for the multimedia use. Viewing angle is 12 o'clock direction. This module is the type of wide viewing angle and high brightness 350cd/m^2. This module has horizontal display mode and vertical display mode.

Backlight-driving DC/AC inverter is not built in this module.

3. Mechanical Specifications

Table 3-1

Parameter	Specifications	Unit
Display size	14.4 (5.7") Diagonal	cm
Active area	115.2 (H) × 86.4(V)	mm
Pixel format	320 (H) × 240 (V)	pixel
	(1 pixel=R+G+B dots)	—
Pixel pitch	0.360(H)×0.360(V)	mm
Pixel configuration	R,G,B vertical stripe	—
Display mode	Normally white	—
Unit outline dimensions 【Note3-1】	144.0(W)×104.6(H)×13.0(D)	mm
Mass	***	g
Surface treatment	Hard-coating (3H)	—

【Note3-1】 Excluding backlight cables.

Outline dimensions is shown in Fig.1

4. Input Terminals

4-1. TFT-LCD panel driving

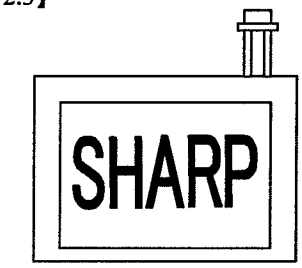
CN1 Used connector:08-6210-033-340-800 (Kyocera Elco Corporation)

Table 4-1

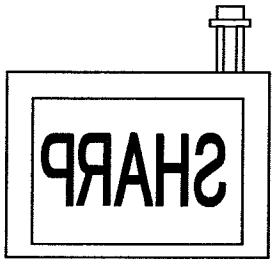
Pin No.	Symbol	I/O	Function	Remark
1	GND	—	GND	
2	CK	I	Clock signal for sampling each data signal	
3	Hsync	I	Horizontal synchronous signal (Negative)	
4	Vsync	I	Vertical synchronous signal (Negative)	
5	GND	—	GND	
6	R0	I	RED data signal (LSB)	
7	R1	I	RED data signal	
8	R2	I	RED data signal	
9	R3	I	RED data signal	
10	R4	I	RED data signal	
11	R5	I	RED data signal (MSB)	
12	GND	—	GND	
13	G0	I	GREEN data signal (LSB)	
14	G1	I	GREEN data signal	
15	G2	I	GREEN data signal	
16	G3	I	GREEN data signal	
17	G4	I	GREEN data signal	
18	G5	I	GREEN data signal (MSB)	
19	GND	—	GND	
20	B0	I	BLUE data signal(LSB)	
21	B1	I	BLUE data signal	
22	B2		BLUE data signal	
23	B3	I	BLUE data signal	
24	B4	I	BLUE data signal	
25	B5	I	BLUE data signal(MSB)	
26	GND	—	GND	
27	ENAB	I	Signal to settle the horizontal display position (Positive)	【Note4-1】
28	Vcc	—	+3.3V power supply	
29	Vcc	—	+3.3V power supply	
30	R/L	I	Horizontal display mode select signal L: Normal, H: Left / Right reverse mode	【Note4-2】
31	U/D	I	Vertical display mode select signal H: Normal, L: Up / Down reverse mode	【Note4-3】
32	V/Q	I	VGA/QVGA mode select signal	
33	GND	—	GND	

【Note 4-1】The horizontal display start timing is settled in accordance with a rising timing of ENAB signal. In case ENAB is fixed "Low", the horizontal start timing is determined as described in 7-2. Don't keep ENAB"High" during operation.

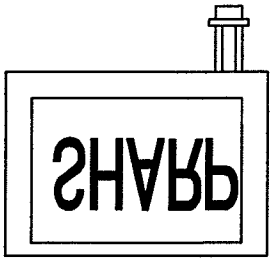
【Note 4-2.3】



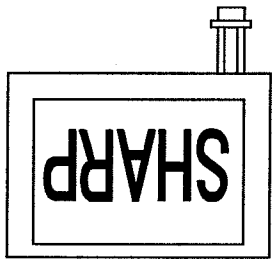
R／L＝L，U／D＝H



R／L＝H，U／D＝H



R／L＝L，U／D＝L



R／L＝H，U／D＝L

5. Backlight driving

CN2 Used connector : BHR-02(8.0)VS-1N (JST)

Corresponding connector : SM02(8.0)B-BHS-1N-TB (JST) (installed on an board.)

Table 5-1

Pin no.	symbol	function	Color of cable
1	VLOW	Power supply for lamp (Low voltage side)	White
2	NC	This is electrically opened.	−
3	VHIGH	Power supply for lamp (High voltage side)	Red

6. Absolute Maximum Ratings

Table 6-1

Parameter	Symbol	Condition	Ratings	Unit	Remark
Input voltage	V_I	Ta=25℃	−0.3 ～ +6.0	V	【Note6-1】
+3.3V supply voltage	Vcc	Ta=25℃	0 ～ +4.0	V	−
Storage temperature	Tstg	−	−30 ～ +80	℃	【Note6-2】
Operating temperature (Panel)	Topa1	−	−10 ～ +70	℃	【Note6-2.3.4】
Operating temperature (Ambient)	Topa2	−	−10 ～ +70	℃	【Note6-5】

【Note6-1】 CK, R0～R5, G0～G5, B0～B5, Hsync, Vsync, ENAB, R/L, U/D, V/Q

【Note6-2】 No parameter is allowed to exceed the range.

【Note6-3】 Maximum wet-bulb temperature at 39℃ or less
No dew condensation.

【Note6-4】 Only operation is guarantied at operating temperature. Contrast, response time, another display quality are evaluated at +25℃.

【Note6-5】 The ambient temperature, When backlight is on.(Reference)

7. Electrical Characteristics

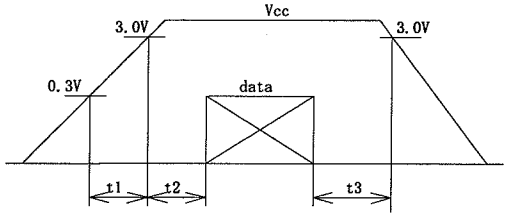
7-1.TFT-LCD panel driving

Table 7-1 Ta＝25℃

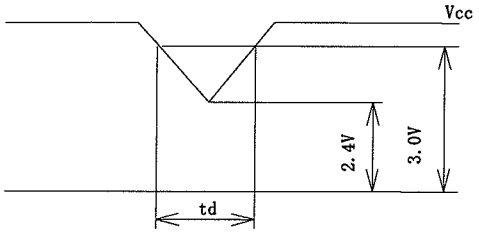
Parameter		Symbol	Min.	Typ.	Max.	Unit	Remark
+3.3V	Supply voltage	Vcc	+3.0	+3.3	+3.6	V	【Note7-1】
	Current dissipation	Icc	—	(130)	(160)	mA	【Note7-2】
Permissive input ripple voltage		V_{RF}	—	—	100	mVp-p	Vcc=+3.3V
Input voltage (Low)		V_{IL}	0	—	0.3Vcc	V	【Note7-3】
Input voltage (High)		V_{IH}	0.7Vcc	—	+5.5	V	
Input current (Low)		I_{OL1}	—	—	10	μA	V_I=0V【Note7-3】
Input current (High)		I_{OH1}	—	—	10	μA	V_I=3.3～5.0V【Note7-4】
		I_{OH2}	—	—	100	μA	V_I=3.3～5.0V【Note7-5】

【Note7-1】
Vcc-turn-on conditions

0＜t1≦20ms
0＜t2≦50ms
0＜t3≦1s



Vcc-dip conditions
Vcc-dip conditions should also follow the Vcc-turn-on conditions
td≦20ms

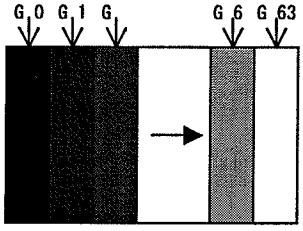


【Note7-2】Vcc=3.3V, V/Q="H"

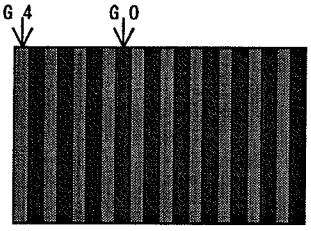
Typical current situation : 64-gray-bar pattern. Timing : Typical signal

Maximum current situation : Vertical stripe pattern by GS0 and GS42 signal on every other Pixel.

(This pattern is used temporarily) Timing : Typical signal



Typical current situation



Maximum current situation

【Note7-3】 CK, R0~R5, G0~G5, B0~B5, Hsync, Vsync, ENAB, R/L, U/D,V/D

【Note7-4】 CK, R0~R5, G0~G5, B0~B5, Hsync, Vsync, R/L, U/D,

【Note7-5】 ENAB, V/D

7-2. Backlight driving

The backlight system is an edge-lighting type with single CCFT (Cold Cathode Fluorescent Tube).

The characteristics of single lamp are shown in table 7-2.

Table 7-2 Ta=25℃

Parameter		Symbol	Min.	Typ.	Max.	Unit	Remark
Lamp voltage		VL7	(620)	(690)	(760)	Vrms	IL=5.0mArms
Lamp current		IL	(4.5)	(5.0)	(5.5)	mArms	Normal operation
Lamp power consumption		WL	—	(3.5)	—	W	
Lamp frequency		fL	(*)	—	(*)	KHz	【Note7-6】
Kick-off voltage	Ta=25℃	VS	—	—	(1350)	Vrms	Sealed is connected to GND.
	Ta=-30℃		—	—	(1470)	Vrms	

(Inverter : HIU-288 [Output Condencer 22pF] Harison Electric co.,LTD.)

【Note7-6】 Lamp frequency may produce interference with horizontal synchronous frequency, and this may cause beat on the display. Therefore lamp frequency shall be detached as much as possible from the horizontal synchronous frequency and from the harmonics of horizontal synchronous to avoid interference. In case of such an usage under the lower temperature environment, periodical lamp exchange is recommended.

8. Timing Characteristics of input signals

Timing diagrams of input signal are shown in Fig.8.

8-1. Timing characteristics

Table 8-1

Parameter		Clock	Symbol	Min.	Typ.	Max.	Unit	Remark
Clock	Frequency		1/Tc	—	25.18	28.33	MHz	V/Q=H
				—	(6.3)	(7.0)	MHz	V/Q=L
	Duty ratio		TH/T	40	50	60	%	
Data	Set up time		Tds	5	—	—	ns	
	Hold time		Tdh	10	—	—	ns	
Horizontal sync. signal	Cycle		TH	30.0	31.8	—	μs	V/Q=H
				770	800	900	clock	
			TH	(50.0)	(63.6)		μs	V/Q=L
				(360)	(400)	(450)	clock	
	Pulse width		THp	2	96	200	clock	
Vertical sync. signal	Cycle		TV	515	525	560	line	V/Q=H
				(251)	(262)	(280)	line	V/Q=L
	Pulse width		TVp	2	—	34	line	
Horizontal display period			THd	320	320	320	clock	
Hsync.-Clock phase difference			THc	10	—	Tc-10	ns	
Hsync.-Vsync. phase difference			TVh	0	—	TH-THp	ns	
Vertical sync. signal start position			TVs	34	34	34	line	V/Q=H
				(7)	(7)	(7)	Line	V/Q=L

Note) In case of lower frequency, the deterioration of the display quality, flicker etc., may occur.

8-2. Horizontal display position

The horizontal display position is determined by ENAB signal .

Table 8-2

Parameter		symbol	Min.	Typ.	Max.	Unit	Remark
Enable signal	Set up time	Tes	5	—	Tc-10	ns	—
	Pulse width	Tep	2	320	TH-10	clock	—
Hsync.-Enable signal phase difference		THe	44	—	TH-664	clock	V/Q=H
			(2)	—	(TH-340)		V/Q=L

Note) When ENAB is fixed at "V/Q=Low", the display starts from the data of C52 (clock) as shown in Fig.8.

When ENAB is fixed at "V/Q=High", the display starts from the data of C104 (clock) as shown in Fig.8.

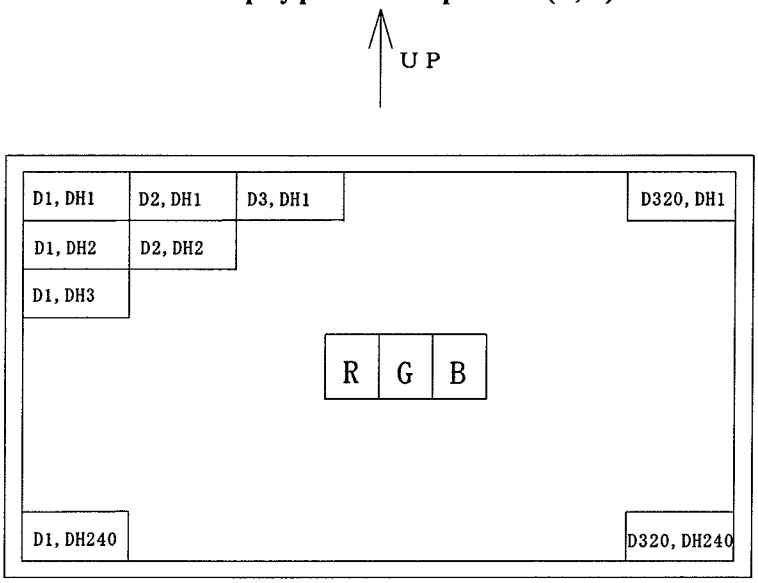
8-3. Vertical display position

The vertical display position (TVs) is fixed at 34th line (V/Q=H) and 7th line (V/Q=L).

Note) ENAB signal is independent of Vertical display position.

8-4. Input Data Signals and Display Position on the screen

Display position of input data. (H, V)



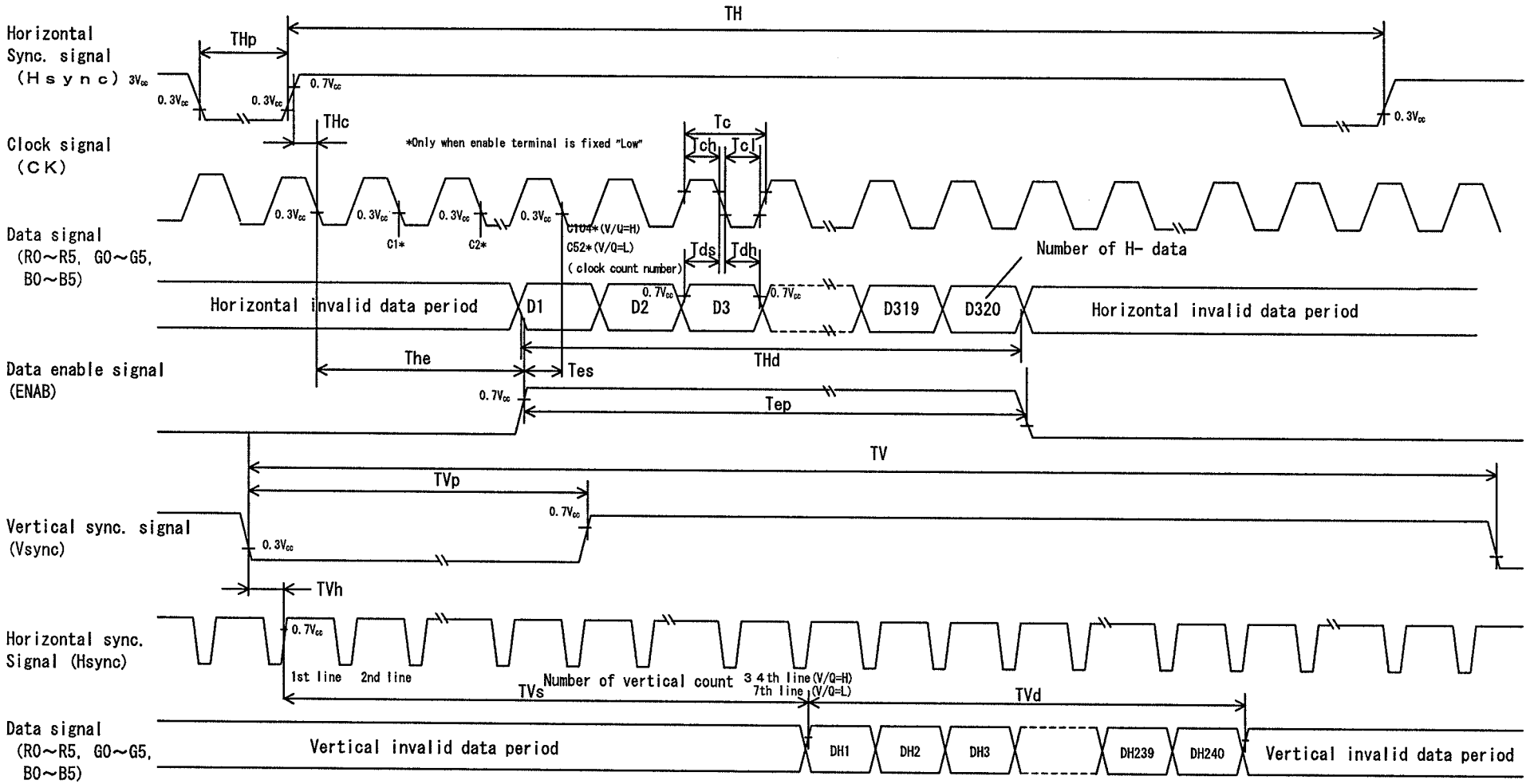


Fig.8 Input signal wave forms

9. Input signal, Basic display colors and Gray scale of each color

Table 9-1

	Colors & Gray scale	Data signal																	
		Gray Scale	R0	R1	R2	R3	R4	R5	G0	G1	G2	G3	G4	G5	B0	B1	B2	B3	B4	B5
Basic color	Black	—	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Blue	—	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1
	Green	—	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0
	Cyan	—	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1
	Red	—	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
	Magenta	—	1	1	1	1	1	1	0	0	0	0	0	0	1	1	1	1	1	1
	Yellow	—	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0
	White	—	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Gray Scale of red	Black	GS0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	⇧	GS1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Darker	GS2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	⇧	↓				↓						↓						↓		
	⇩	↓										↓						↓		
	Brighter	GS61	1	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
	⇩	GS62	0	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
	Red	GS63	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
Gray Scale of green	Black	GS0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	⇧	GS1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
	Darker	GS2	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
	⇧	↓				↓														
	⇩	↓				↓														
	Brighter	GS61	0	0	0	0	0	0	1	0	1	1	1	1	0	0	0	0	0	0
	⇩	GS62	0	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0
	Green	GS63	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0
Gray Scale of blue	Black	GS0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	⇧	GS1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
	Darker	GS2	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
	⇧	↓																		
	⇩	↓																		
	Brighter	GS61	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	1	1
	⇩	GS62	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
	Blue	GS63	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1

0 : Low level voltage, 1 :High level voltage

Each basic color can be displayed in 64 gray scales from 6 bit data signals. With the combination of total 18 bit data signals, the 262,144-color display can be achieved on the screen.

10. Optical Characteristics

Table 10-1 Ta=25℃, VCC=+3.3V

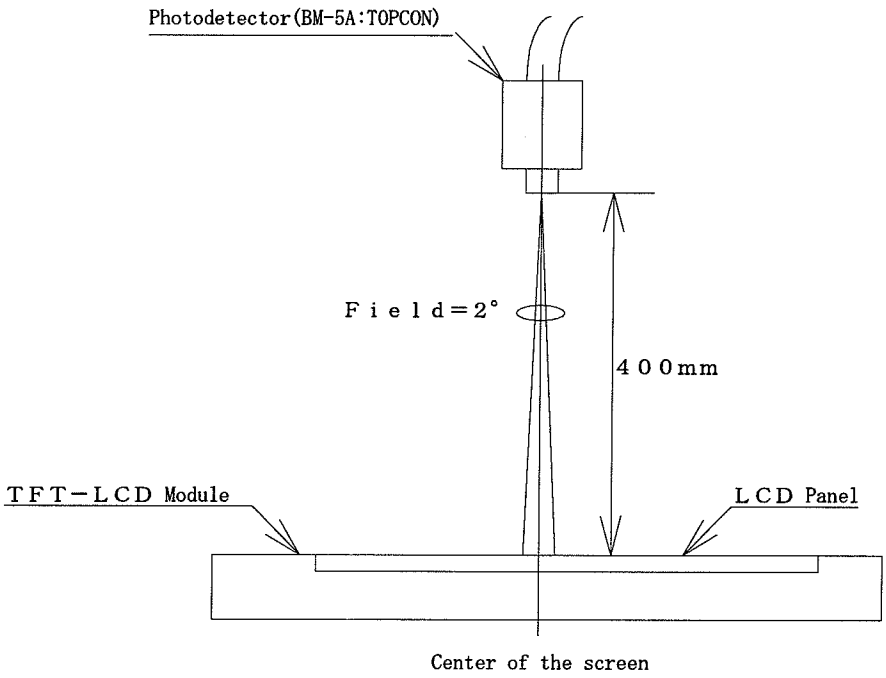
Parameter		Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Viewing angle range	Horizontal	θ 21, θ 22	CR≧5	(60)	(65)	—	Deg.	【Note10-1】
	Vertical	θ 11		(60)	(65)	—	Deg.	
		θ 12		(35)	(40)	—	Deg.	
Contrast ratio		CRmax	Best viewing angle	60	—	—		【Note10-2】
Response time	Rise	τ r	θ =0°	—	30	60	ms	【Note10-3】
	Decay	τ d		—	50	100	ms	
Chromaticity of white		x	IL=5.0mArms	—	(0.319)	—		【Note10-4】
		y		—	(0.329)	—		
Luminance of white		Y		( )	(350)	—	cd/m²	
Lamp endurance	+25℃	—	Continuous operation	(40,000)	(50,000)	—	hour	【Note10-5】

The inverter was used to evaluate the back light unit.

The measurements were done 30 min later after switching on the backlight.

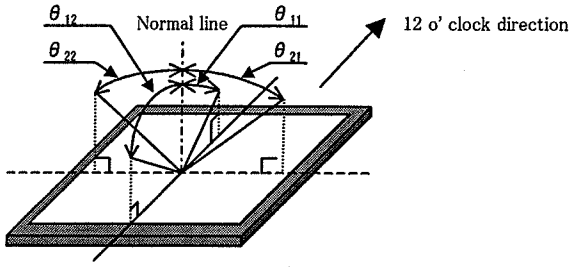
ＨＩＵ－２８８[Output condenser ２２ｐＦ]

(Harison Electric co.,LTD.)



Optical characteristics measurement method

【Note 10-1】 Definition of viewing angle range



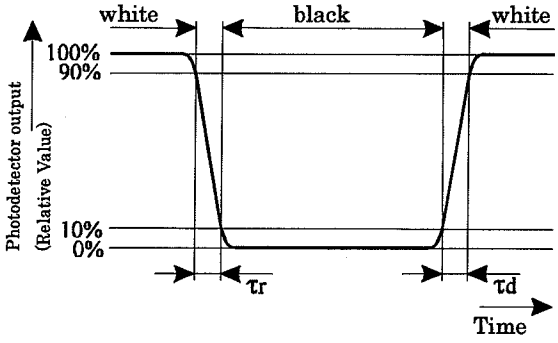
【Note 10-2】 Definition of contrast ratio

The contrast ratio is defined as follows.

$$\text{Contrast Ratio (CR)} = \frac{\text{Luminance (brightness) with all pixels white}}{\text{Luminance (brightness) with all pixels black}}$$

【Note 10-3】 Definition of response time :

The response time is defined as the following figure and shall be measured by switching the input signal for "black" and "white".



【Note 10-4】 This shall be measured at the center of the screen. The measurement was done 30 min later after switching on the backlight. (characteristic of the first stage)

Inverter drive frequency : (49) kHz

【Note 10-5】 Continuous operation time which doesn't deteriorate the brightness under 50% of the brightness at the beginning.

(Condition) IL=5.0 mArms (adjusting the brightness by current)

11. Handling Precautions

11-1. Installing the TFT-LCD module

①TFT-LCD module has holes at the corner of the reverse side of the module to install. M3 tapping screw is recommended. (torque : 0.25 ～ 0.30 N·m)

Be sure to design the cabinet so that the module can be installed without any extra stress such as warp or twist.

Be sure to design the cabinet so that the any switch doesn't press the module directly.

②Be sure to turn off the power supply when inserting or disconnecting the cable.

③Connect GND of Inverter to the metal sealed case of the module.

If the connection is not sufficient, it may cause the followings,

a) Increasing of noise from back light.

b) Unstable inverter output.

c) Partial heating up.

11-2. Installation of the TFT-LCD module

Installation Precautions

①Since the front polarizer is easily damaged, pay attention to avoid rubbing with something hard or sharp. Please use ionized nitrogen to blow particle off. When polarizer is soiled, wipe out with cloth for lenses.

②When the metal parts of TFT-LCD module (shield case) becomes dirty, wipe it out dry and soft cloth. If it cannot be removed easily, blow your breath on it and wipe it out.

③Wipe off water drop immediately. Long contact with water may cause discoloration or spots.

④Since TFT-LCD modules consist of glass and refined wires and components, it may break, crack or internal wire breaking if dropped or bumped on hard surface. Handle with care.

⑤Since CMOS LSI is used in this module, take care of static electricity and injure the human GND, when handling.

11-3. Notice for the design of products

①Design the product to keep TFT-LCD module from sodium chloride or water.

②Consider a sufficient counter measure for EMI from LCD module to application, when designing.

11-4. Others

①Liquid-crystal is deteriorated by ultraviolet rays. Do not leave it in the direct sun light and strong ultraviolet rays for many hours.

②If it is kept at a temperature below the rated storage temperature, it becomes coagulated and the panel may be broken. Also if it is isotropic liquid and does not return to its original state. Therefore, it is desirable to keep it at room temperature as much as possible.

③Kick-off voltage of back light may be required over rated voltage, due to the leakage current from the lamp cable.

④When the LCD is broken, liquid-crystal may leak from the panel. Use care so that it does not enter your eyes and mouth. If it gets on hands, legs, and clothes, wash it away immediately, using soap.

⑤Follow the general precautions for ordinary electronic parts.

12. Packing form

① Piling number of cartons : MAX. (undecided)

② Package quantity in one carton : pcs. (undecided)

③ Carton size : (W) × (D)× (H) mm (undecided)

④ Total mass of 1 carton filled with full modules : kg (undecided)

⑤ Conditions for storage

Temperature	: 0～40°C
Humidity	: 60%RH or less
Atmosphere	: Harmful gas, such as acid or alkali which bites electronic components and /or wires , must not be detected.
Period	: about 3 months
Opening of the package	: In order to prevent the LCD module from break down by electrostatic charges, Please control the room humidity over 50%RH and open the package taking sufficient countermeasures against electrostatic charges, such as earth, etc..

13. Others

① As the volume of the LCD-module is adjusted correctly, do not change the adjustment. If the adjustment is changed, the LCD-module may not satisfy the specification.

② Do not break up the LCD-module to prevent the trouble.

③ Static image displayed for long time may cause residual image.

④TFT-LCD drive input and output connector (33 pins Kyocera elco corporation :08-6210-033-340-800)

a) Adapted FPC

b) Holding power of the terminal : 0.9 N/pin or over
(pulling out each terminal at 25±3 mm/min)

c) Durability against inserting and extracting
: Double of the beginning data or less
(Difference of the contact resistance after 20 times of inserting and extracting, using adapted FPC.)

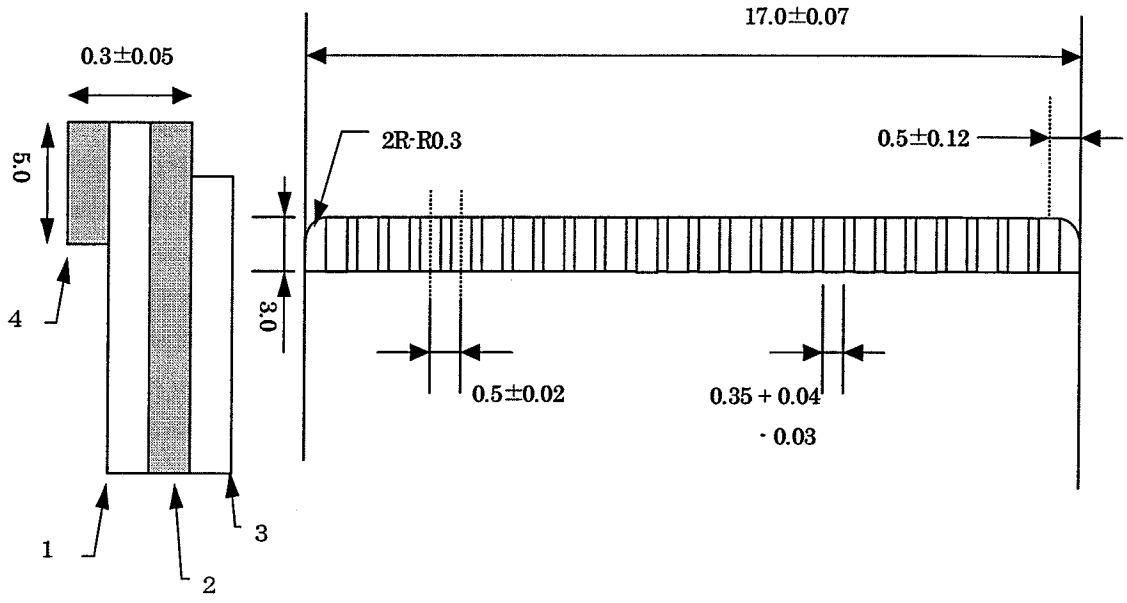


Table 13-1

Number	Name	Material
1	Base	Polyimide or the same kind of material （２５μm thickness）
2	Copper layer	Thin Copper film （３５μm thickness） Solder plating ２μm or more
3	Cover layer	Polyimide or same kind of material
4	Support board	Polyester, Polyimide or the same kind of material （１８８μm thickness）

FPC adapted to Input output connector （０.５mm pitch）

14. Conditions of Reliability tests

Table 14-1

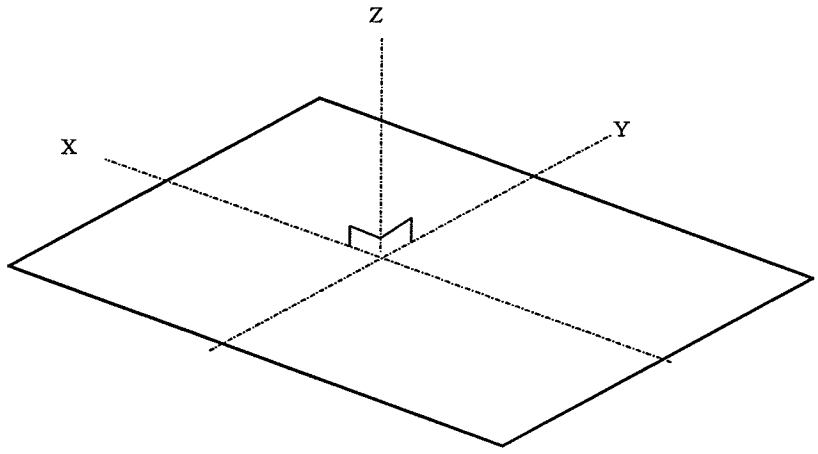
No.	Test items	Conditions
1	High temperature storage test	Ta=80℃ 240h
2	Low temperature storage test	Ta=－30℃ 240h
3	High temperature & high humidity operation test	Ta=40℃ , 95%RH 240h (No condensation)
4	High temperature operation test	Ta=70℃ 240h
5	Low temperature operation test	Ta=－10℃ 240h Lamp endurance is excepted.
6	Electro static discharge test	±200V, 200pF (0Ω) 1 time for each terminal.
7	Shock test (non- operating)	Max. gravity : 490m/s^2 ·6ms Direction :±X,±Y,±Z 3 times for each direction. (JIS C0041)
8	Vibration test (non- operating)	Frequency : 5～57Hz/Vibration width : 0.15 mm : 58～500Hz/Acceralation: 9.8m/s^2 Sweep time : 11 minutes Test period : 3 hours (1 hours in each direction of X,Y,Z)
9	Heat shock test	Ta = －30 °C ～ +80°C / 100 cycles (0.5h) (0.5h)

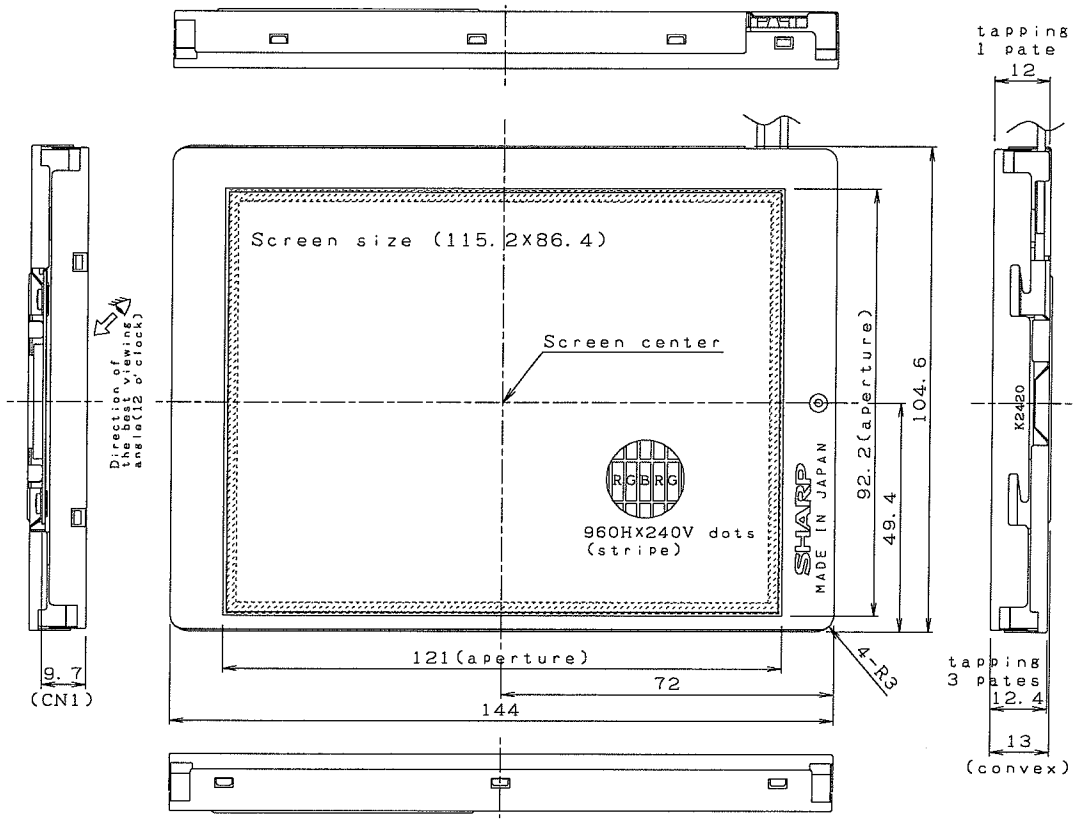
【Result Evaluation Criteria】

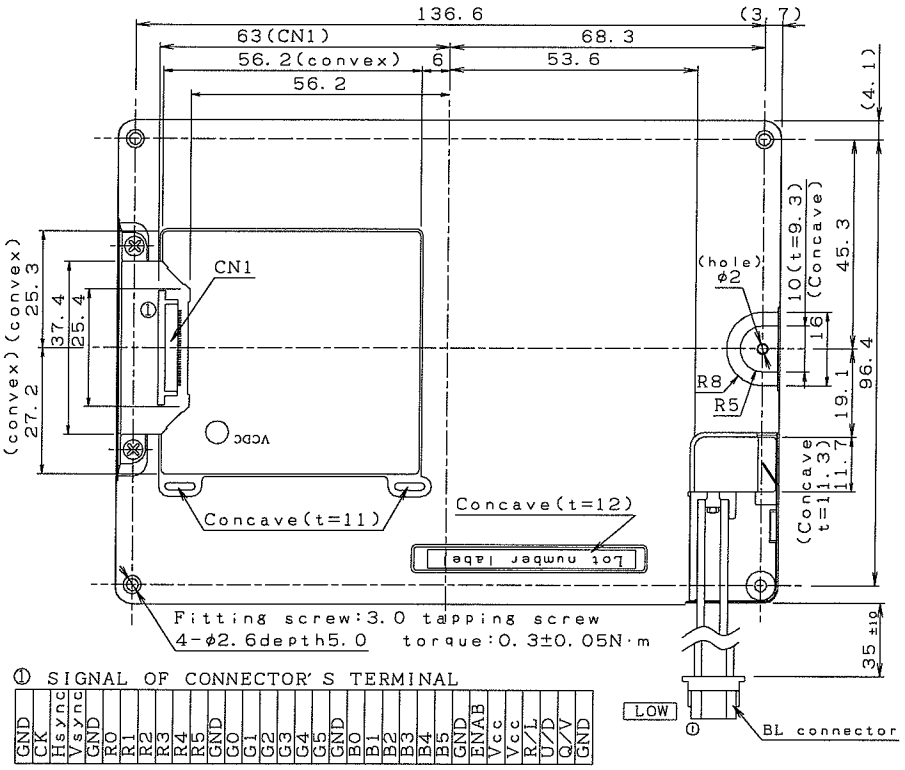
Under the display quality test conditions with normal operation state, these shall be no change, Which may affect practical display function.

(This condition is the target specification on the mass production. It may not satisfy this specification on test sample.)

【Note】The following figure shows the definition of X axis. Y axis. Z axis.







① SIGNAL OF CONNECTOR' S TERMINAL

GND	CK	Hsync	Vsync	GND	R0	R1	R2	R3	R4	R5	GND	G0	G1	G2	G3	G4	G5	GND	B0	B1	B2	B3	B4	B5	GND	ENAB	Vcc	Vcc	R/L	U/D	Q/V	GND

The tolerance is ±0.5 except when spcified.

Consider the set design to hide the scratches and bubbles appeared on the polarizer or the frame area which is located outside of assurance area.

The tolerance width of the module excludes warp of the case.

CN1 connector:ELCO 08-6210-033-340-800

BL connecter:JST BHR-02VS-1N

Unit: mm

Outline dimensions of 5.7" TFT Model

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